Section 2: The Phonological Hierarchy

This will be a simple description of the phonological hierarchy, since much more detailed study will have to be done before a full report can be given. There appear to be at least four phonological levels, called the contour, clause, word and syllable. In the grammatical hierarchy there is still another level between the word and clause, called the phrase.

2.1. The Contour.

The contour is a stretch of speech carrying one intonation tune.

2.2. The Clause.

The clause is bounded by shorter pauses than those occurring at the end of a contour. These pauses are noticeable in recorded texts, particularly before [di] or [ka] which connect clauses.

Many of the contours in the language are made up of more than one clause.

2.3. The Word.

The boundaries of the word are marked in various ways. Vowel harmony operates within the phonological word. Therefore a change of harmony marks the boundary between words.

The word consists of from one to five syllables. Four or five syllable words are not at all common. Most words are composed of only one or two syllables.

Glottal stop occurs at the beginning of words which begin with vowels. It also occurs following short vowels in open syllables occurring word final.

The phonological word does not correspond exactly with the grammatical word in all instances:

[bʊ̀ʊ̀nbé] 'kid'

Here the one grammatical word is two phonological words as it changes harmony.

2.4. The Syllable.

The syllable consists of a nucleus and a margin which precedes the nucleus, or precedes and follows it. The nucleus may be either a vowel or a syllabic nasal. The margin consists of a single consonant. The most common syllable patterns are CV and CVC.

A juncture feature occurs between syllables when [r] is followed by [g], [g] by [l], or [k] by [l]:

[bər$^{\ominus}$gi] 'to turn back' [sɔg$^{\ominus}$lɪ] 'to hide'

[sɔk$^{\ominus}$lɪ] 'to forget'

Section 3: CV Patterns

3.1. The Syllable.

V	[dɛa]	'to find'
VC	[ɪl]	'breast'
CV	[dɪga]	'soup
CVC	[vuk]	'idol'

3.2. The Word.

i] One Syllable:

V	[a]	'and'
VC	[ɪl]	'breast'
CV	[be]	'child'
CVC	[sok]	'to burn'

ii] Two Syllables:

VCV	[ʊlɛ]	'navel'
CVCV	[dama]	'house'
CVCVC	[basɔn]	'shade'
CVCCV	[bɔrsa]	'cobra'
CVCCVC	[gantɛl]	'back'

V only occurs in 2 syllable words preceding or following CV:

	V	CV	CVC
V	~~*~~	ʊ.lɛ	~~*~~
CV	dɛ.a	bɔ.tɛ	ba.sɔn
CVC	~~*~~	fuŋ.ha	gan.tɛl

iii] Three Syllables:

VCVCV	[atura]	'three'
VCCVCV	[aŋkɔra]	'water drum'
CVCVCV	[dopɪha]	'storm'
CVCCVCV	[buŋgana]	'monkey'
CVCVCCV	[karantɛ]	'cutlass'

Section 4: Interpretation of Suspect Segments and Sequences of Segments.

The interpretation problems involve suspect segments which may be interpreted as consonant or vowel [4.1], suspect segments which may be single or complex units [4.2], and suspect sequences which may be interpreted as single or complex units [4.3]. The presentation in each case will be in terms of a] the problem, b] the discussion, and c] the conclusion.

4.1. Suspect Segments Which may be a Consonant or Vowel.

a] There are four high vocoids [i,ɪ,u,ʊ] which are suspect because they may be interpreted as consonants or as vowels.

b] i] A high vocoid occurring as the first phone of a syllable before another vowel is not syllabic and is interpreted as a consonant:

[wa]	'to come'	[ya]	'to do'
[wul]	'star'	[yak]	'to shoot'

ii] A high vocoid occurring between consonants or between a consonant and silence is syllabic and interpreted as a vowel.

[di]	'to eat'	[din]	'fire'
[du]	'to plant'	[gur]	'to count'

iii] High vocoid and a vowel. There are no non-suspect consonant clusters syllable initial, but neither are there any non-suspect vowel clusters. The high vocoid could be interpreted as labialization of the preceding consonant, e.g.

[ad^{w}a] 'prayer'

or it could be interpreted as forming a complex nucleus with the following vowel, e.g.

[ad^{u}a] 'prayer'

Though this would avoid creating a new syllable pattern, it would create a series of new, complex phonemes.

As two vowels often carry two different tones, it would seem best to interpret the high vocoid in such sequences as a vowel. This establishes a CV.V pattern, which while a new word pattern, uses well established syllable patterns.

iv] Vowel and high vocoid. Almost all these sequences are with -u/-ʊ. Again, these could be considered as forming a complex nucleus with the preceding vowel, but this creates new complex phonemes. Alternatively, they could be a VV sequence or a VC sequence. There is very little to choose between these two, but a VV sequence is indicated by the tone changes which can take place across the morpheme break when the clause clitic -u/- is added to verb stems.

[yaw-a]	'market'	[n di-u]	'I eat'
[yaʊ-sa]	'markets'	[n lɪst-ʊ]	'I divorce'

c] Conclusion: A high vocoid occurring as the first phone of a syllable before another vowel is interpreted as a consonant.

A high vocoid occurring between two consonants or between a consonant and silence is interpreted as a vowel.

A high vocoid occurring before or following a vowel is interpreted as a vowel.

4.2. Suspect Segments Which May be Single or Complex Units.

The segments to be discussed in this section are ñ [4.21], nasalized vocoids [4.22], syllabic nasals [4.23], and nasal + w [4.24].

4.21. Interpretation of [ñ].

a] The alveopalatal nasal may be interpreted as a single nasal consonant or as a sequence of the consonants n and y.

b] The [ñ] usually occurs word initial, and in this position there are no non-suspect consonant clusters. In two instances it occurs word medial. In both it is syllable initial, when there are no non-suspect consonant clusters.

[aña:] 'five' [tšɛñɛ] 'fly'

[ñ] could possibly be interpreted as n and y, but, since y is rarely found word medial, it seems better to interpret it as a single consonant.

c] Conclusion: [ñ] is interpreted as one consonant.

4.22. Interpretation of nasalized vocoids.

a] A nasalized vowel can be interpreted as a vowel plus nasal, or as a single complex vowel unit.

b] Evidence for VN: i] Final [n] may elide or change with nouns:

[nɛ̃n] 'hand' [nɛ̃-sa] 'hands'

No verbs have been found with a final [n] but with a final [Ṽ].

ii] In text, VN sometimes alternates with Ṽ:

[hũn] [hũ] 'him, her'

Evidence against VN: i] In spite of the lack of contrast before consonants, VN conflicts with the fact that /m,n, and ŋ/ all occur final.

[kə hõ]	'whistle'	[sõn]	'name'
[kə ɤõŋ]	'boil [it]'	[nũ-hã]	'cow'
[kə zãm]	'greet [him]'	[põ]	'rotten'

/ñ/ and /ŋm/ are the only nasals not occurring final.

ii] There are contrasts like the following:

[anããsʊ]	'four'	[ŋmᵇɛnsa]	'ropes'

If [Ṽ] is here interpreted as VN, it would either hide the contrast or demand CCC.

c] Conclusion: Nasalized vowels are interpreted as single complex vowel units.

4.23. Interpretation of Syllabic Nasals.

a] A syllabic nasal can be interpreted as a single consonant, or as a vowel plus consonant.

b] Syllabic nasals have a very limited distribution, but they contrast with the common vowel-nasal sequences in the language:

[n̩ na-ʊ].	'I see [it]'	[n ŋɔ hʊn-ʊ]	'I tell him'

The fact that these vowel-nasal sequences exist would make it confusing to write syllabic nasals in the same way when they are actually different.

c] Conclusion: Syllabic nasals are interpreted as single syllabic consonants.

4.24. Interpretation of Nasal + [w].

a] A nasal + [w] can be interpreted as CC, as a complex phoneme, or as a consonant plus vowel.

[dʊnwa] 'Is it going to rain?' [ŋwara...] 'I don't...

b] Nasal + [w] is interpreted as CC for the following reasons:

1] All other occurrences of nasal plus consonant are interpreted as CC.

2] Nasal + [w] often occurs across morpheme boundaries:

[ŋ wara...] 'I don't...'

3] Interpreting [w] as /u/ would create VVV in examples such as:

[dʊnwaʊ] 'rain is coming'.

4.3. Suspect Sequences Which May be Single or Complex Units.

The sequences to be discussed in this section are consonant clusters [4.31], suspect vowel sequences [4.32], lengthened vowels [4.33], and lengthened contoids [4.34].

4.31. Interpretation of Consonant Clusters.

a] The suspect consonant clusters which occur are the labio-velar stops, the labio-velar nasal, the aspirated stops, the affricated stops, and nasal-consonant sequences. These cluster may be interpreted as two separate consonants or as one complex consonant.

b] All of the first three groups occur word initial where there is no non-suspect pattern for a consonant cluster. The labio-velar stops and labio-velar nasal only occur initial or in compounds at the beginning of the second word.

The aspiration on the stops is very slight, and there is no contrast between aspirated and unaspirated stops.

The affricated stops are not very suspect, since [š] and [ž] do not occur as separate sounds.

All of these parallel the single consonants which occur in the initial consonant position:

[gbaŋ] - [baŋ]	[džɨ] - [dɨ]	[tša] - [sa]
[ŋmᵇɛn] - [mᵇɛ]	[gba] - [ba]	[kpo] - [go]
[pʰa] - [ba]	[tʰɛ] - [dɛ]	[kʰo] - [go]

Therefore they are all interpreted as single consonants.

The remaining consonant clusters are nasal-consonant sequences. Nasals have been found to occur preceding the following consonants:

[m] preceding p,b,t,d,kp,s,f,v,n.	[damsa]	'houses'
[n] preceding b,t,d,ts,z,s,l,h,w.	[tunda]	'pestle'
[ŋ] preceding p,k,g,s,l,n,h.	[fɔŋha]	'town'
	[buŋkul]	'stone'

Nasal + consonant is interpreted as CC for the following reasons:

1] There are other CC patterns that are non-suspect.

2] The nasal is sometimes heterorganic. -

c] Conclusion: The labio-velar stops, the labio-velar nasal, the aspirated stops, and the affricated stops are interpreted a one unit. The nasal-consonant sequences are interpreted as two units.

4.32. Interpretation of vowel sequences.

a] Vowel sequences can be interpreted as single complex vowel units or as a sequence of vowels, composing either one or two syllables.

b] It was convenient to discuss this problem in connection with the interpretation of the high vowels [4.1]. Therefore, it is not necessary to discuss it again at this point.

c] Conclusion: All vowel sequences are interpreted as a sequence of two vowels.

4.33. Interpretation of lengthened vowels.

a] Lengthened vowels can be interpreted as single vowels or as a sequence of identical vowels.

b] All of the vocoid qualities that have been found short have also been found long [except ɐ]. They have been found between a contoid and silence as in:

[pɛ:] 'rope' [da:] 'stick' [du:] 'forest'

and between contoids as in:

[zɛ:m] 'stick dance' [dža:nt] 'mat' [zazɔ:n] 'evening

Vowel sequences only occur within the morpheme in a very

small number of loan words:

[malaɪka] 'angel' [adua] 'prayer' [nataʊ] 'shoe'

They are much more common across morpheme boundaries:

[n̩ di-u] 'I eat' [n̩ bɔ-u] 'I pay'

Therefore diverse vowel sequences only occur in 3 loan words and when the clause clitic is added to a V final word.

Within the morpheme there appears on present data to be no tone change across the vowel sequence, while across the morpheme boundary tone changes do occur, and the -u clitic could be considered unique.

Diverse vowel sequences are therefore neither parallel grammatically nor phonologically, and so it would be best to interpret long vowels as single vowel phonemes.

c] Conclusion: Long vowels are interpreted as single vowel phonemes.

4.34. Interpretation of long contoids.

a] Long contoids can be interpreted as single contoids or as a sequence of identical contoids.

b] Long contoids found so far include [m:], [n:], [ŋ:], and [r:]. Length is contrastive in the following example:

[nõ] 'oil' [n:ũ:] 'I hear'

All occur across morpheme boundaries and are interpreted as CC.

[m:o:] /mmoo/ 'I hit' [bur:ɛ] /b r-rɛ/ 'cloud'

c] Long contoids are interpreted as a sequence of identical contoids.

Section 5: Phonetic Work Chart.

Consonants:

	Labial	Labio-dental	Labio-velar	Alveolar	Alveo-palatal	Velar	Glottal
Plosives:	p		kp	t	tš	k	[ʔ[1]]
	b		gb	d	dž	g	
Fricatives:		f		s			h
		v		z			ʁ
Nasals:	m		ŋm	n	ñ	ŋ	
Lateral:				l			
Vibrants:				ř, r̃			
Semi-vowels:	w				y, [ỹ[2]]		

Vowels:

		Front		Central		Back	
High.	Tense:	i	ĩ			u	ũ
	Lax:	ɪ	ɪ̃			ʊ	ʊ̃
Low.	Tense:	e	ẽ			o	õ
	Lax:	ɛ	ɛ̃	a	ã	ɔ	ɔ̃

[1] Treated as a feature of juncture [see 2.3].

[2] Rare - found only next to a nasalized vowel.

Labials:

p	b	kp	gb	ŋm	m
pi 'to mark'	bi 'mountain'	kpiti 'to wrench'	gbini 'to uncover'		
pa 'to collect	ba 'they'	kpa 'to take'	gba 'to roam'		
par 'to weed'	bar 'place'	kpar 'much'	gbama 'hard ground'	ŋmaga 'pepper'	maga 'all'
pooni 'to tear'			gbooni 'to crawl'		
kapura 'bag'	gabuga 'big rope'		kagba 'cap'		

f	v	w
fɛ 'to plan'	vɛ 'to refuse'	wɛ 'small'
falɩ 'new'	valɩ 'to walk'	walɩ 'parent'
fuk 'to pull'	vuk 'idol'	wuti 'truth'
tefi 'termite nest'	tevi 'pipe'	

Alveolars:

r	l	t	d
	lampo 'tax'	tama 'few'	dama 'house'
	lɔ 'to sing'	tɔ 'to deny'	dɔ 'to own'
	lo 'belly'	toha 'bow'	do 'to feed [animals]'
	lukti 'to scoop'	tum 'to send'	dum 'snake'
marɩ 'to place'	malɩ 'money'	matɩ 'to ask'	dadam 'congregation'
luri 'medecine'	luli 'to drip'	gutɩ 'to roll'	tunda 'pestle'
karantɛ 'cutlass'	kalaga 'trap'		
nar 'person'	tšal 'blood'		
har 'to sew'	hal 'egg'		

tš	dž	s	z
tšal 'blood'	džaanɩ 'mat'	sal 'courtyard'	zagɞm 'leper'
tšamsɩ 'metal bowl'		samna 'girl friend'	
tša 'to say'		sa 'to prepare'	
tšɩlɛ 'hawk'	džɩr 'lizard'		zɩr 'to take'
tšɔ 'to lie down'		sɔ 'to wash'	zɔ 'to play'
tšɛha 'deer'		sɛhɩ 'to agree'	zɛna 'mat'
tšik 'to cover'	dži 'to cross'	si 'to get up	zim 'to know'
kpatšaga 'leaf'		tšasa 'rubbish'	bazaŋa 'mosquito'
matšɛrɛ 'blacksmith'		dasɩrɩ 'secret'	bazɔɔlɛ 'entrance'
muntšɛta 'millet'		fuŋsɩ 'to be light'	

Nasals:

n	ñ	ŋ	ŋm	m
na 'to see'	ñana 'father'		ŋmaga 'pepper	maga 'all'
nɔ 'mouth'	ñɔ 'to drink'	ŋɔ 'to tell'		mɔm 'to laugh'
ni 'water'	ñini 'to look at'			
nʊsʊn 'lie'	ñuha 'head'			mʊnɛ 'ant'
bini 'gravel'	ñɪñɪkha 'glow worm'	kpɪŋɪ 'trader'	nɪŋmɪɛn 'corn'	zimi 'hen'
kanɪ 'to sit'		ñaŋɪ 'to conquer'	aŋmɪɛna 'how many'	zamɛ 'congregation'
bʊn 'load'		dʊŋdʊŋ 'only'		

Velars:

k	g	kp	gb
karɩ 'to judge'	garɩgɩ 'to answer'	kpaŋɩ 'to try'	gbarɩ 'also'
kʊtɩ 'to dress'	gʊtɩ 'to roll'		gbʊl 'to be blunt'
kam 'pumpkin'		kpam 'yam'	gbɛsa 'to clear [ground]'
kok 'to protect'	go 'to surround'	kpo 'to kill'	gbogʊmta 'lion'
daka 'box'	zagəm 'leper'		kagba 'cap'
nakawa 'tsetse fly'	maga 'all'		naagbʊŋ 'knee'
aŋkɔra 'water drum'	aŋgoom 'centipede'		
sɔkəlɩ 'to hide'	sɔgəlɩ 'to forget'		
yɔksɩ 'to be soft'	yogəlɩ 'to sell'		

Palatal:

ñ	y	h
ñana 'father'	ya 'to do'	ha 'to raise [hand]'
ñine 'fish'	yi 'salt'	
ñɔ 'to drink'	yɔksɩ 'to be soft'	hɔkɩ 'to faint'
ñɛ 'to give'	yɛlɩ 'crack'	
ñɩñɩkha 'glow worm'	kɔya 'soap'	

Front Vowels:

i	ɩ	e	ɛ
di 'to eat'	dɩsa 'soup'	desi 'to dream'	dɛsɩ 'to be drunk'
bi 'mountain'		be 'child'	bɛ 'mountains'
lisi 'to think'	lɩsɩ 'to choose'		

Central Vowels:

a	ə	ɪ	ʊ
far 'to close'	fər 'to pierce'	fɪr 'to be muddy'	wʊl 'star'
bara 'skin'	bərə 'to return'	hɪl 'witch'	kokʊl 'yam heap'
kani 'to sit'	kənə 'thing'	hɪn 'you'	hʊn 'him'

Back Vowels:

u	ʊ	o	ɔ
luli 'to bring forth'	lʊlɪ 'to drip'	lo 'belly'	lɔ 'to sing'
du 'to plant	dʊ 'to put'	do 'to feed'	dɔ 'to own'
bumi 'to begin'	bʊn 'load'	bom 'joint'	bɔmɪ 'to be difficult'
kuha 'owl'	tʊha 'heart'	toha 'bow'	tɔha 'village'

Evidence for Length.

In this section the contrast will be given for each of the 9 vowel qualities:

[i]	tši:ma 'scarf'	tšise 'knife'
[ɩ]	tɩ:na 'owner'	tɩl 'to reach'
[e]	le:mu 'orange'	lesi 'to choose'
[ɛ]	zɛ:m 'stick dance'	zɛmbɛ 'fish trap'
[a]	ya:kɩ 'to copy'	yak 'to shoot'
[u]	su:n 'guinea fowl'	suk 'to dip'
[ ]	bʊ:n 'goat'	bʊn 'load'
[o]	mo:ri 'to be quiet'	mori 'to stop'
[ɔ]	yɔ:ka 'hip belt'	yɔksɩ 'to be soft'

Section 7: Chart of Phonemes.

Consonants:

	Labial	labio-dental	Labio-velar	Alveo-lar	Alveo-palatal	Velar	Glottal
Plosives:	p		kp	t	č	k	
	b		gb	d	ǰ	g	
Fricatives:		f		s			h
		v		z			
Nasals:	m		ŋm	n	ñ	ŋ	
Lateral:				l			
Vibrant:				r			
Semi-vowel:	w				y		

Vowels:		Front	Central	Back
High.	Tense:	i		u
	Lax:	ɩ		ʊ
Low.	Tense:	e		o
		ɛ	a	ɔ

Section 8: Formational Statement of Phonemes.

8.1. Consonants.

/p/ [p] Voiceless bilabial slightly aspirated plosive.

[pisi] /pisi/ 'sheep' [paɾ̃] /par/ 'hoe'

/b/ [b] Voiced bilabial plosive.

[bɛ] /bɛ/ 'mountains' [nɩba:l] /nɩbaal/ 'man'

/t/ [t] Voiceless alveolar slightly aspirated plosive.

[tɛ:nɛ] /tɛɛnɛ/ 'earth' [atura] /atura/ 'three'

/d/ [d] Voiced alveolar plosive.

[din] /din/ 'fire' [tʊnda] /tʊnda/ 'pestle'

/k/ [k] Voiceless velar slightly aspirated plosive.

[kor] /kor/ 'bench' [hok] /hok/ 'bone'

/g/ [g] Voiced velar plosive occurring initially, following a nasal, and between front vowels in intervocalic position.

[gaŋgaha] /gaŋgaha/ 'crow' [džigir /ǰigiri/ 'to tremble

[ʁ] Voiced uvular fricative occurring elsewhere.

[maʁa] /maga/ 'all' [poʁi] /pogi/ 'corn'

/kp/[kp] Voiceless labio-velar double plosive.

[kpam] /kpam/ 'yam' [dakpala] /dakpala/ 'walking stick'

/gb/[gb^{y}] Voiced palatalized labio-velar double plosive occurring before /ɛ/.

[gb^{y}ɛntɛl] /gbɛntɛl/ 'flat rock' [gb^{y}ɛl] /gbɛl/ 'mat'

[gb] Voiced labio-velar double plosive occurring elsewhere.

[gbɩha] /gbɩha/ 'wolf' [na:gbuŋ] /naagb ŋ/ 'knee'

/f/ [f] Voiceless labio-dental fricative.

[fi] /fi/ 'ten' [mafa] /mafa/ 'gun'

/v/ [v] Voiced labio-dental fricative.

[vaha] /vaha/ 'dog' [tevi] /tevi/ 'pipe'

/s/ [s] Voiceless alveolar grooved fricative.

[si] /si/ 'eye' [mi:sa] /miisa/ 'nose'

[š] Voiceless alveo-palatal grooved fricative occurring in free variation with [s] with some speakers.

/z/ [z] Voiced alveolar fricative.

[za:ga] /zaaga/ 'horse' [wozo] /wozo/ 'day'

/h/ [h] Voiceless glottal fricative with very little friction.

[hok] /hok/ 'bone' [pɩha] /pɩha/ 'wind'

/č/ [tš] Voiceless alveo-palatal grooved affricate.

[tšɛ] /čɛ/ 'tomorrow' [matšɛrɛ] /mačɛrɛ/ 'blacksmith'

/ǰ/ [dž] Voiced alveo-palatal grooved affricate.

[džɪr] /ǰɪr/ 'lizard' [dža:nɩ] /ǰaanɩ/ 'mat'

/m/ [m̩] Voiced bilabial syllabic nasal occurring initially preceding a consonant.

[m̩gɔʊ] /m gɔ-ʊ/ 'I dance'

[m] Voiced bilabial non-syllabic nasal occurring elsewhere.

[mi:sa] /miisa/ 'nose' [dama] /dama/ 'house'

/n/ [n̩] Voiced alveolar syllabic nasal occurring initially preceding a consonant.

[n̩tɔʊ] /n tɔ-ʊ/ 'I deny [it]'

[n] Voiced alveolar non-syllabic nasal occurring elsewhere.

[nɪn] /nɪn/ 'tooth' [anɔra] /anɔra/ 'six'

/ñ/ [ñ] Voiced alveo-palatal non-syllabic nasal.

[ño] /ño/ 'to drink' [añu:] /añuu/ 'five'

/ŋ/ [ŋ̩] Voiced velar syllabic nasal occurring initially preceding a consonant.

[ŋ̩ha] /ŋha/ 'sun'

[ŋ] Voiced velar non-syllabic nasal occurring elsewhere.

[baŋa] /baŋa/ 'what'

/ŋm/[ŋm^{y}] Voiced palatalized labio-velar double nasal occurring before /ɛ/.

[ŋm^{y}ɛntɛl] /ŋmɛntɛl/ 'spider' [aŋm^{y}ɛna] /aŋmɛna/ 'how much'

[ŋm] Voiced labio-velar double nasal occurring elsewhere.

[ŋmaha] /ŋmaha/ 'farm'

/l/ [l] Voiced alveolar lateral.

[lo] /lo/ 'belly' [tšal] /čal/ 'blood'

/r/ [ř] Voiced alveolar flapped vibrant.

[kɔřɪ] /kɔrɪ/ 'to make' [nař] /nar/ 'person'

[r̃] Voiced alveolar trill occurs in ideophones and when two /r/s are contiguous.

[bɔr̃ɛ] /bɔr-rɛ/ 'haze'

/w/ [w] Voiced high back rounded non-syllabic vocoid occurring preceding central and back vowels.

[wa] /wa/ 'to come' [wʊtɪ] /w tɪ/ 'truth'

[w^y] Voiced high back rounded and palatalized non-syllabic vocoid [with heavy friction] occurring preceding front vowels.

[w^yi] /wi/ 'to cry' [w^yilim] /wilim/ 'to sweat'

/y/ [y] Voiced high front unrounded non-syllabic vocoid occurring initially and intervocalic with oral vowels.

[oyaʊ] /o ya-ʊ/ 'he did [it]'

[ỹ] Voiced high front unrounded nasalized non-syllabic vocoid occurring intervocalic with nasalized vowels.

[otšɪ̃ŋ̃ɪ̃ỹãʊ] /o čɪŋɪya-ʊ/ 'he is standing'

8.2. Vowels.

/i/ [i] Voiced high front vocoid of a tense quality.

[si] /si/ 'eye' [tši:ma] /čiima/ 'scarf'

/ɪ/ [ɘ] Voiced central vocoid of indistinct quality occurring between voiced consonants.

[bɘna] /bɪna/ 'year' [zagɘm] /zagɪm/ 'leper'

[ɪ] Voiced high front vocoid of a lax quality occurring elsewhere.

[tšɪm] /čɪm/ 'to meet' [hɪl] /hɪl/ 'witch'

/e/ [e] Voiced low front vocoid of a tense quality.

[tevi] /tevi/ 'pipe' [na:se] /naase/ 'ankles'

/ɛ/ [ɛ] Voiced low front vocoid of a lax quality.

[bɛ] /bɛ/ 'mountains' [lɛha] /lɛha/ 'spoon'

/a/ [a] Voiced low central vocoid of a lax quality.

[ñʊnba:n] /ñʊnbaan/ 'road' [pař] /par/ 'to send'

/ɔ/ [ɔ] Voiced low back vocoid of a lax quality.

[zɔ] /zɔ/ 'bush cow' [fɔŋha] /fɔŋha/ 'town'

/o/ [o] Voiced low back vocoid of a tense quality.

[do] /do/ 'to sleep' [bo:l] /bool/ 'song'

/ʊ/ [ə] Voiced central vocoid of indistinct quality occurring following voiceless consonants, and preceding voiced consonants except /l/.[1]

[fər] /fʊr/ 'to pierce' [kən] /kʊn/ 'thing'

[ʊ] Voiced high back vocoid of a lax quality occurring elsewhere.

[dʊm] /dʊm/ 'to bite' [gbogumta] /gbog mta/ 'lion'

/u/ [u] Voiced high back vocoid of a tense quality.

[tu] /tu/ 'to come down' [puŋ] /puŋ/ 'to satisfy'

[1] The situation regarding [ə] is still unclear and requires further study.

Section 9: Supra-Segmental Features.

9.1. Length.

A phoneme of length may occur with each of the 9 phonemic vowels of the language:

/zɛɛm/	'stick dance'	/zɛmbɛ/	'fish trap'
/yaakʊ/	'to copy'	/yak/	'to shoot'
/buun/	'goat'	/bun/	'load'
/moori/	'to be quiet'	/mori/	'to stop'

9.2. Tone.

9.2.1. Number of Tones.

In Tampulma the syllable is the tone bearing unit. There are two phonemic tones, high and low. These contrast in identical environment.

/tɔ́/	'to deny'	/čɔ́/	'to lie'
/tɔ̀/	'to close'	/čɔ/	'to run'

9.2.2. Downdrift.

A high tone coming after a sequence of high and low is not as high as a preceding high, and a low coming after a sequence of low-high is lower than the preceding low.

/o zɵ kok baal ti-u/
he will protect man the

9.2.3. Downstep.

Between words: Sometimes a high following another high is lower than the preceding high. Downstep is postulated to account for this. Between words the occurrence of downstep is conditioned by grammatical factors and described in terms of grammatical rules.

/ò fà kók ꜜbáál tí-ú/
he today protect man the

[Here a high noun following a high verb is lowered in the imperfective aspect].

/bì tágán ꜜfí tí/
children bad ten the

[Here a high numeral is lowered by a preceding attributive of this class].

9.2.4. Other Perturbations.

A low following a high will generally be raised to high. This rule does not operate under certain grammatical conditions [the same conditions which condition downstep].

/ò kók báál tì-ú/
he protects man the

[Not perturbed in the present perfective after a verb of this class].

/ò kók ꜜbáál tì-ú/
he is protecting man the

[Perturbed in the present imperfective after a verb of this class].

/ò ná ꜜbáál tì-ú/
he sees man the

[Perturbed in present perfective after a verb of this class].

A low-high word of more than one syllable which has been raised [see 9.2.4] will be high followed by lowered high.

/bì wílé tà/ 'the sore children'

/nín wílé tà/ 'the sore hands'

One syllable low-high glide changes to a high-lowered high glide.

/bè hɛɛ tì/ 'the old child'

/nín hɛɛ tì/ 'the old hand'

Section 10: Distribution of Phonemes.

10.1. Consonants occurring singly.

10.1.1. All consonants except /r/ can occur initially in morpheme and word.

/p/	/pɛna/	'moon'
/b/	/bara/	'skin'
/t/	/tɔha/	'village'
/d/	/dama/	'house'
/k/	/kalaga/	'trap'
/g/	/gar/	'cloth'
/kp/	/kpam/	'yam'
/gb/	/gbarɪgɪ/	'cripple'
/f/	/fuŋha/	'baboon'
/v/	/vaha/	'dog'
/s/	/saha/	'time'
/z/	/zaaga/	'horse'
/h/	/hal/	'egg'
/č/	/čamsɪ/	'metal bowl'
/ǰ/	/ǰankono/	'cat'
/m/	/munčɛta/	'millet'
/n/	/nantɔ/	'saliva'
/ñ/	/ñana/	'father'
/ŋ/	/ŋɔ/	'to tell'
/ŋm/	/ŋmaha/	'farm'

/l/	/lʊŋa/	'drum'
/w/	/wozo/	'day'
/y/	/yawa/	'market'

10.1.2. All consonants can occur word medial.

/p/	/kapʊra/	'bag'
/b/	/gabʊ/	'onion'
/t/	/gbɛntɛl/	'flat rock'
/d/	/dadam/ [1]	'congregation'
/k/	/daka/	'box'
/g/	/lʊga/	'footprint'
/kp/	/bokpɛrɩ/	'bark [of tree]'
/gb/	/kagba/	'cap'
/f/	/naafɩnɛ/ [2]	'claw'
/v/	/tevi/	'pipe'
/s/	/piisi/	'sheep'
/z/	/bazaŋa/	'mosquito'
/h/	/vaha/	'dog'
/č/	/mačɛrɛ/	'blacksmith'
/ǰ/	/baǰɛɛma/ [3]	'to respect'
/m/	/kokuma/	'donkey'
/n/	/bini/	'gravel'
/ñ/	/añuu/	'five'
/ŋ/	/bɛɛŋa/	'lake'
/ŋm/	/nɩŋmɛn/	'corn'

/l/	/kalaŋ/	'mat'
/r/	/garaga/	'calabash'
/w/	/butowe/	'young girl'
/y/	/sariya/ [1]	'judgment'

[1] /d/ and /y/ are rare in this position, and then only occur in loan words.

[2] /f/ in medial position usually only occurs in loan words, e.g. /kafa/ 'comb', /siŋkafa/ 'rice', /ǰɩfa/ 'pocket'.

[3] This is the only occurrence of /ǰ/ in medial position that we have found so far.

10.1.3. The only consonants occurring word final are /k/, /m/, /n/, /ŋ/, /l/, and /r/.

/k/	/čɔk/	'to be spoilt'
/m/	/tɔm/	'beard'
/n/	/nabaan/	'desert'
/ŋ/	/ǰɩbaŋ/	'river bank'
/l/	/gantɛl/	'back'
/r/	/par/	'to weed'

10.2. Consonants occurring in clusters.

10.2.1. Consonant clusters in word initial position.

There are only three phonemes which can form the first member of a cluster in initial position, /m/, /n/, and /ŋ/. All the consonants except /r/ can form the second member, provided that the points of articulation correspond.

/m/ is followed by /p/, /b/, /f/, /v/, /m/.

/n/ is followed by /t/, /d/, /s/, /z/, /h/, /č/, /ǰ/, /n/, /ñ/, /l/, /y/.

/ŋ/ is followed by /k/, /g/, /kp/, /gb/, /ɲ/, /ŋm/, /w/. In every case the cluster is across a morpheme boundary.

/mp/	/m-par-u/	'I weed'
/mb/	/m-bɔ-u/	'I pay'
/mf/	/m-far-u/	'I close'
/mv/	/m-vɛ-u/	'I refuse'
/mm/	/m-mɔri-u/	'I stop'
/nt/	/n-tɪl-u/	'I reach'
/nd/	/n-dum-u/	'I bite'
/ns/	/n-sɛm-u/	'I say'
/nz/	/n-zɪm-u/	'I know'
/nh/	/n-hok-u/	'I bury'
/nč/	/n-čɔ-u/	'I run'
/nǰ/	/n-ǰi-u/	'I cross'
/nn/	/n-na-u/	'I see'
/nñ/	/n-ñɛ-u/	'I give'
/nl/	/n-lil-u/	'I swallow'
/ny/	/n-ya-u/	'I do'
/ŋk/	/ŋ-kok-u/	'I protect'
/ŋg/	/ŋ-gur-u/	'I count'
/ŋkp/	/ŋ-kpo-u/	'I kill'
/ŋgb/	/ŋ-gbaŋ-u/	'I lead'
/ŋŋ/	/ŋ-ŋɔ-u/	'I tell'
/ŋɲm/	/ŋ-ŋmɛ-u/	'I steal'
/ɲw/	/ɲ-wa-u/	'I come'

10.2.2. Consonant clusters in word medial position.

The consonant clusters which occur word medially within morpheme boundaries have as their first members /m/, /n/, /ŋ/, /k/, /l/, and /r/.

/m/ is followed by /p/, /b/, /t/, /n/, and /s/.

/n/ is followed by /f/.

/ŋ/ is followed by /b/, /k/, /g/, /n/, /s/, and /h/.

/k/ is followed by /t/, /m/, /s/, and /h/.

/l/ is followed by /b/.

/r/ is followed by /s/.

/mp/	/hampɛɛm/	'shoulder'
/mb/	/bembi/	'chest'
/mt/	/gbogumta/	'lion'
/mn/	/samna/	'girl friend'
/ms/	/lɛmsɪ/	'to taste'
/nf/	/funfuk/	'breeze'
/ŋb/	/nɛŋbɔ/	'valley'
/ŋk/	/buŋkul/	'stone'
/ŋg/	/buŋgana/	'monkey'
/ŋn/	/daŋnɪ/	'to want'
/ŋs/	/fuŋsɪ/	'to be light'
/ŋh/	/fuŋha/	'baboon'
/kt/	/lukti/	'to scoop out'
/km/	/lakmɪ/	'to join'

/ks/	/pɔɔksɛ/	'to open'
/kh/	/ñɛñɛkha/	'glow worm'
/lb/	/kɔlba/	'bottle'
/rs/	/tʊrsɛ/	'to sneeze'

The consonant clusters which occur word medially across morpheme boundaries have as their first members /m/, /n/, /k/, /r/, and /l/.

/m/ is followed by /b/ and /k/.

/n/ is followed by /p/, /b/, /d/, and /f/.

/k/ is followed by /d/.

/r/ is followed by /t/.

/l/ is followed by /f/.

/mb/	/dʊmbotihok/	'tick'
/mk/	/kpamkom/	'casava'
/np/	/sanpar/	'axe'
/nb/	/bʊʊnbe/	'kid'
/nd/	/haandʊŋ/	'junior wife'
/nf/	/dinfʊl/	'charcoal'
/kd/	/nɔkdaa/	'pole'
/rt/	/bartɔn/	'flesh'
/lf/	/bʊgɛlfɛha/	'tree flower'

10.2.3. Consonant clusters in word final position.

There are no consonant clusters occurring word finally.

10.3. Vowels occurring singly.

10.3.1. All vowels except /e/, /ɛ/, and /ʊ/ can occur initially in morpheme and word.

/i/	/i-/	'you [sing.]'
/ɪ/	/ɪl/	'breast'
/a/	/aŋgoom/	'centipede'
/ɔ́/	/ɔsɪ/	'to suck'
/o/	/o-/	'he'
/u/	/ule/	'navel'

10.3.2. All vowels can occur word medial.

	CVC		CVCV	
/i/	/pil/	'roof'	/sini/	'tear'
/ɪ/	/hɪl/	'witch'	/dɪsa/	'soup'
/e/	/sel/	'animal'	/yeli/	'to crow'
/ɛ/	/pɛn/	'to be wide'	/lɛwa/	'hunt'
/a/	/sal/	'courtyard'	/bara/	'skin'
/ɔ/	/sɔn/	'name'	/bɔtɛ/	'bag'
/o/	/gok/	'to knock'	/togu/	'fox'
/ʊ/	/sul/	'dawadawa tree'	/lʊha/	'to wrestle'
/u/	/gur/	'to count'	/luha/	'funeral'

10.3.3. All vowels can occur word final.

/i/	/bíni/	'gravel'
/ɪ/	/barɪ/	'conversation'
/e/	/čise/	'knife'

/ɛ/	/čɩlɛ/	'hawk'
/a/	/dɩsa/	'soup'
/ɔ/	/nantɔ/	'saliva'
/o/	/lampo/	'tax'
/ʊ/	/gabʊ/	'onion'
/u/	/togu/	'fox'

10.4. Vowels occurring in clusters.

10.4.1. All vowels when lengthened can occur word medial.

/i/	/miisa/	'nose'
/ɩ/	/tɩɩna/	'owner'
/e/	/leemu/	'orange'
/ɛ/	/hɛɛra/	'sand'
/a/	/zaaga/	'horse'
/ɔ/	/yɔɔka/	'hip belt'
/o/	/koose/	'bean cake'
/ʊ/	/bʊʊn/	'goat'
/u/	/suun/	'guinea fowl'

10.4.2. All vowels when lengthened, except /i/ and /ɩ/, can occur word final.

/e/	/lee/	'he is'
/ɛ/	/pɛɛ/	'rope'
/a/	/daa/	'stick'
/ɔ/	/nɔɔ/	'mouth'
/o/	/loo/	'stomach'

/ʊ/	/nʊ /	'oil'
/u/	/duu/	'forest'

10.4.3. Diverse vowel clusters across morpheme boundaries all occur with the clause clitic /-u,-ʊ,-o/ as the second member.

/i-u/	/n di-u/	'I eat'
/o-u/	/n kpo-u/	'I kill'
/u-u/	/n du-u/	'I plant'
/ɪ-ʊ/	/n lɪsɪ-ʊ/	'I divorce'
/ɛ-ʊ/	/n fɛtɛ-ʊ/	'I chase'
/a-ʊ/	/n la-ʊ/	'I go'
/ɔ-ʊ/	/n bɔ-ʊ/	'I pay'
/ʊ-ʊ/	/n dʊ-ʊ/	'I put'
/e-o/	/n bote-o/	'I break'

10.4.4. Diverse vowel clusters within the morpheme are restricted to a very small number of loan words.

/aɪ/	/malaɪka/	'angel'
/aʊ/	/nataʊ/	'shoe'

10.4.5. Distribution of nasalization on vowels.

All short and long vowels are nasalized preceding and following /m/, /n/, /ñ/, /ŋ/, and /ŋm/. Nasalization is heavy when it occurs with /ñ/ and /ŋ/, but it is less evident preceding and following the other nasals.

/mũra/	'story'	/sũmũ/	'lies'
/čĨĨmã/	'scarf'		

/nɔ̃/	'this'	/čẽnẽ/	'that'
/dõõn/	'rain'		
/ñɛ̃/	'to give'	/doñɪkaɪ/	'lightning'
/bãñɔ̃ɔ̃ka/	'necklace'		
/tɛ̃ŋaɪ/	'to cut'	/sũŋĩ/	'to help'
/bɛ̃ɛ̃ŋã/	'lake'		
/ŋmɛ̃nsa/	'ropes'	/ãŋmɛ̃nã/	'how many'
/ŋmɛ̃ɛ̃r/	'thief'		

Nasalization also occurs preceding and following /h/ and /y/ when these follow a nasal or nasalized long vowels.

/ŋhã/	'sun'	/ŋmãhã/	'farm'
/nũhã/	'cow'		
/o čĩŋĩỹũ/	'he is standing'		
/vɔ̃ɔ̃vɔ̃hã/	'wasp'		

Low open front, central, and back vowels are nasalized when they occur in their lengthened form following /p/, /kp/, /k/, /f/, /v/, and /h/.

/pɔ̃ɔ̃/	'spoilt'	/makpãã/	'all'
/kɔ̃ɔ̃/	'tired'	/fɔ̃ɔ̃/	'nothing'
/vɔ̃ɔ̃vɔ̃hã/	'wasp'	/hɛ̃ɛ̃/	'old'

COLLECTED LANGUAGE NOTES

No. 9

Collected Field Reports on

THE PHONOLOGY OF TAMPULMA

Richard Bergman
Ian and Claire Gray

Institute of Linguistics (West Africa)

Published by
Institute of African Studies
University of Ghana
1969